CLAIMS

What is claimed is:

1. A computer implemented method comprising:

defining a spatial location across a series of pictures of an MPEG stream; and

for each picture of the series of pictures in the MPEG stream, partially decoding the picture to determine an area of the picture falling within the spatial location.

2. The method of claim 1 further comprising fully decoding at least the spatial location in the picture, but not all of the picture.

3. The method of claim 1 further comprising forming a plurality of substreams from the partially decoded MPEG stream.

4. A computer implemented method comprising:

decoding a picture of an MPEG stream into a plurality of slices having a set of slices at least partially within an area of the picture, the area being less than all of the picture;

decoding at least the set of slices but not the plurality of slices into a plurality of macroblocks having a set of macroblocks within the area; and

decoding at least the set of macroblocks but not the plurality of macroblocks into pixels.

5. The method of claim 4 wherein the area is a region of interest.

6. The method of claim 4 further comprising displaying the decoded set of macroblocks.

7. A computer implemented method comprising:

creating an MPEG compliant substream from an MPEG stream including a plurality of pictures, the substream corresponding to a region of interest (ROI), said ROI being an area of each picture of the plurality of pictures smaller than the total area of each picture; and

transmitting the substream.

8. The method of claim 7 further comprising synchronizing display of the substream with a second MPEG compliant substream from the MPEG stream.

9. The method of claim 7 wherein the creation and transmission of the substream are performed in a lock-step manner.

10. A computer implemented method comprising:

a client defining a region of interest (ROI) for each of a plurality of nodes;

the client transmitting an attribute file to the plurality of nodes, said attribute file including the defined regions of interest;

the client broadcasting an MPEG stream to the plurality of nodes, the MPEG stream having a series of pictures;

for each picture in the series of pictures of the MPEG stream, each of the plurality of nodes,

partially decoding an area of the picture including at least the defined ROI,

fully decoding the defined ROI,

buffering the ROI; and

the client directing display of each picture in the series of pictures.

11. The method of claim 10, wherein the client commanding display of the picture comprises:

waiting for a signal from each of the plurality of nodes that the ROI has been decoded; and

transmitting a command to the plurality of nodes to display their ROI.

12. The method of claim 10 further comprising a lock-step mechanism for buffering a fully decoded picture.

13. A computer implemented method comprising:

a client decoding a picture from an MPEG stream;

the client selecting a Region of Interest in the picture;

the client constructing a new MPEG picture corresponding to the region of interest;

the client transmitting the new MPEG picture to a node; and

the client commanding the node to display the new MPEG picture.

14. The computer implemented method of 13 wherein the picture is an I-picture and the client constructing the new MPEG picture comprises:

decoding the I-picture into a plurality of macroblocks;

storing the plurality of macroblocks into a plurality of data structures, each of the plurality of data structures corresponding to a different one of the plurality of regions of interest; and

forming a new MPEG compliant I-picture from the macroblocks stored in one of the plurality of data structures.

15. The computer implemented method of 13 wherein the picture is a P/B-picture and the client constructing the new MPEG picture comprises:

decoding the P/B-picture into a plurality of slices;

decoding each slice of the plurality of slices into a plurality of macroblocks;

if a macroblock of the plurality of macroblocks is an I-macroblock, storing the I-macroblock into one of a plurality of data structures, each of the plurality of data structures representing a different one of the plurality of regions of interest;

if the macroblock of the plurality of macroblocks is a P/B-macroblock having at least one reference macroblock and if the reference macroblock is out of the represented region of interest, converting the P/B-macroblock into a new I-macroblock;

if the macroblock of the plurality of macroblocks is a P/B-macroblock and the P/B-macroblock is a skipped macroblock and follows a new I-macroblock

and the picture is a B-picture, converting the P/B-macroblock into a new I-macroblock;

if the macroblock of the plurality of macroblocks is a P/B-macroblock and the P/B-macroblock is a skipped macroblock and will occur at the beginning or end of a new slice, converting the P/B-macroblock into a new I-macroblock;

storing the new I-macroblocks and remaining P/B-macroblocks of the plurality of macroblocks into the plurality of data structures;

forming a new slice with the macroblocks stored in one of the plurality of data structures;

accumulating a plurality of the new slices; and

forming an MPEG compliant P/B-picture by encoding the plurality of the new slices.

16. The method of claim 13, wherein the regions of interest are different spatial locations of the picture which form the picture when combined.

17. The method of claim 13 wherein the regions of interest are overlapping areas of the picture which form the picture when combined.

18. The method of claim 13 further comprising commanding a second node to display a second new picture from the picture in synchronization with display of the new picture.

19. An apparatus comprising:

a network;

a first computer on the network,

to divide a picture of an MPEG stream into a plurality of regions,

to broadcast the picture over the network, and

a plurality of computers on the network, each of the plurality of computers,

to partially decode an area of the picture, said area of the picture corresponding to one of the plurality of regions,

to fully decode the corresponding one of the plurality of regions; and

to display the fully decoded one.

20. The apparatus of claim 19 further comprising:

the first computer to transmit an attribute file over the network, said attribute file having a definition of the plurality of regions.

21. The apparatus of claim 19 further comprising:

the first computer to synchronize display of the plurality of regions to form the picture.

22. An apparatus comprising:

a network to connect a first computer to a plurality of computers;

the first computer

to construct a plurality of MPEG substreams from a source MPEG stream,

to transmit each of the plurality of MPEG substreams to a corresponding computer of the plurality of computers, and

each of the plurality of computers to display one of the plurality of MPEG substreams.

23. The apparatus of claim 22 further comprising:
the first computer to synchronize display of the plurality of MPEG substreams.

24. The apparatus of claim 22 further comprising:
each of the plurality of nodes to decode one of the plurality of MPEG substreams with a conventional MPEG decoder.

25. An apparatus comprising:
a network to connect a client to a plurality of nodes;
the client to assign a region of an MPEG encoded picture to at least one of said plurality of nodes, the region being smaller than the picture; and
each of the plurality of nodes to display its assigned region of the picture.

26. The apparatus of claim 25 wherein the client to assign each of the plurality of regions comprises:
the client transmitting one of the plurality of regions to at least one of the plurality of nodes.

27. The apparatus of claim 25 wherein each of the plurality of nodes display its region of the picture in synchronization.

28. The apparatus of claim 25 wherein the client to assign each of the plurality of regions comprises:

dividing the MPEG encoded picture into a plurality of new MPEG compliant pictures, each of the plurality of new MPEG compliant pictures forming the MPEG encoded picture when combined.

29. The apparatus of claim 25 wherein each of the plurality of nodes to display its region of the picture comprises:

each of the plurality of nodes partially decoding the MPEG encoded picture; and

each of the plurality of nodes further decoding its region of the MPEG encoded picture.

30. A machine-readable medium that provides instructions, which when executed by a set of processors, cause said set of processors to perform operations comprising:

defining a spatial location across a series of pictures of an MPEG stream; and

for each picture of the series of pictures in the MPEG stream, partially decoding the picture to determine an area of the picture falling within the spatial location.

31. The machine readable medium of claim 30 that provides instructions, which when executed by a set of processors, cause said set of processors to perform operations further comprising fully decoding at least the spatial location in the picture, but not all of the picture.

32. The machine readable medium of claim 30 that provides instructions, which when executed by a set of processors, cause said set of processors to perform operations further comprising forming a plurality of substreams from the partially decoded MPEG stream.

33. A machine-readable medium that provides instructions, which when executed by a set of processors, cause said set of processors to perform operations comprising:

decoding a picture of an MPEG stream into a plurality of slices having a set of slices at least partially within an area of the picture, the area being less than all of the picture;

decoding at least the set of slices but not the plurality of slices into a plurality of macroblocks having a set of macroblocks within the area; and

decoding at least the set of macroblocks but not the plurality of macroblocks into pixels.

34. The machine readable medium of claim 33 wherein the area is a region of interest.

35. The machine readable medium of claim 33 further comprising displaying the set of decoded macroblocks.

36. A machine-readable medium that provides instructions, which when executed by a set of processors, cause said set of processors to perform operations comprising:

creating an MPEG compliant substream from an MPEG stream including a plurality of pictures, the substream corresponding to a region of interest

(ROI), said ROI being an area of each picture of the plurality of pictures smaller than the total area of each picture; and

transmitting the substream.

37. The machine readable medium of claim 36 that provides instructions, which when executed by a set of processors, cause said set of processors to perform operations further comprising synchronizing display of the substream with a second MPEG compliant substream from the MPEG stream.

38. The machine readable medium of claim 36 further comprising a lock-step mechanism governing the creation and transmission of the substream.

39. A machine-readable medium that provides instructions, which when executed by a set of processors, cause said set of processors to perform operations comprising:

a client defining a region of interest (ROI) for each of a plurality of nodes;

the client transmitting an attribute file to the plurality of nodes, said attribute file including the defined regions of interest;

the client broadcasting an MPEG stream to the plurality of nodes, the MPEG stream having a series of pictures;

for each picture in the series of pictures of the MPEG stream, each of the plurality of nodes,

partially decoding an area of the picture including at least the defined ROI,

fully decoding the defined ROI,

buffering the ROI; and

the client directing display of each picture in the series of pictures.

40. The machine readable medium of claim 39, wherein the client commanding display of the picture comprises:

waiting for a signal from each of the plurality of nodes that the ROI has been decoded; and

transmitting a command to the plurality of nodes to display their ROI.

41. The machine readable medium of claim 39 further comprising a lock-step mechanism for buffering the fully decoded ROI.